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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/700,780	11/04/2003	Yasuhiro Sekiguchi	501646.20002	5491
26418	7590	08/31/2006	EXAMINER	
REED SMITH, LLP ATTN: PATENT RECORDS DEPARTMENT 599 LEXINGTON AVENUE, 29TH FLOOR NEW YORK, NY 10022-7650			GARCIA JR, RENE	
			ART UNIT	PAPER NUMBER
			2853	

DATE MAILED: 08/31/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	10/700,780	SEKIGUCHI, YASUHIRO	
	Examiner	Art Unit	
	Rene Garcia, Jr.	2853	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 14 August 2006.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-27 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-27 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 04 November 2003 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some * c) ☐ None of:
1. ☒ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|---|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413) |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | Paper No(s)/Mail Date. _____ |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

Continued Examination Under 37 CFR 1.114

1. A request for continued examination under 37 CFR 1.114, including the fee set forth in 37 CFR 1.17(e), was filed in this application after final rejection. Since this application is eligible for continued examination under 37 CFR 1.114, and the fee set forth in 37 CFR 1.17(e) has been timely paid, the finality of the previous Office action has been withdrawn pursuant to 37 CFR 1.114. Applicant's submission filed on 14 August 2006 has been entered.

Claim Rejections - 35 USC § 102

2. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

3. Claims 1, 2, 3, 5, 7, 8, 9, 11, 15, 16, 17, 19, 20, 21, 25, 26 & 27 are rejected under 35 U.S.C. 102(b) as being anticipated by Takahashi et al. (US 6,412,896).

Takahashi et al. discloses the following claimed limitations:

*regarding claims 1, 7 & 15, apparatus for ejecting droplets (col. 4, lines 14-16)

comprising:

*plurality of nozzles/**618**/ (fig. 1) through which droplets are ejected

*plurality of liquid containing chambers/**ink chambers, 613**/ each connected at one longitudinal end thereof with a corresponding nozzle/**618**/ (fig. 1; col. 3, lines 51-61)

*actuator/**actuator substrate, 601**/ that changes a volume of each of the liquid containing chambers/**613**/

*actuator controller/**controller, 625/** that controls driving of the actuator/**601/** (figs. 1 & 3; col. 4, lines 9-30)

*actuator controller/**125/** applies in accordance with a one-dot printing instruction, to the actuator/**601/** an ejection pulse signal/**ejection pulse B/** (fig. 4b) that increases the volume of the liquid containing chamber to cause ejection of a droplet (col. 4, lines 20-24; col. 5, lines 65-66), and subsequently only on additional pulse signal/**ejection stabilizing pulse D/** that increases the volume of the liquid containing chamber to pull back a part of the droplet about to be ejected (col. 6, lines 1-8)

*pulse width of the ejection pulse signal/**Pulse B/** is A times a time T required for a pressure wave to propagate in one way longitudinally through the liquid containing chamber (col. 4, lines 31-36; col. 5, lines 62-65), where A is a positive constant less than 1 (col. 6, lines 9-18; fig. 4b)

*wherein the ejection pulse/**Pulse B/** and the only one additional pulse signal/**Pulse D/** generates a stable ejection of minute droplets (col. 6, lines 2-8)

*regarding claims 2, 8, 16, 19, 26 & 27, time interval between a completion of an application of the ejection pulse signal/**Pulse B/** and a start of an application of the additional pulse signal/**Pulse D/** is B/W_e times the time T (fig. 4b; col. 6, lines 9-18), where B/W_e is a positive constant

*total value of the constants A and B is 1.15 to 1.38 (total value not limited to a specific mathematical operation, therefore a subtraction of B minus A results in limitation $[2.0T - 0.7T = 1.3T]$)

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*regarding claims 3, 9 & 17, pulse width of the additional pulse signal/**Pulse D**/ is C/W_F times the time T, where C/W_F is a constant within 0.4 to 0.5 (fig. 4b; col. 6, lines 9-18)

*regarding claims 5 & 11, each of the liquid containing chambers/**ink chamber, 613**/ includes a pressure chamber connected at one longitudinal end thereof with a corresponding nozzle/**618**/ and at the other end thereof with a ink supply source, a volume of the pressure chamber being changed by the actuator/**actuator substrate, 601**/ (fig. 1 & 2; col. 3, line 59- col. 4, line 30)

*wherein the liquid containing chamber/**613**/ is a space from an end portion of the ink supply source on the pressure chamber side, through the pressure chamber, to the nozzle (fig. 1 & 2; col. 3, line 51- col. 4, line 8)

*regarding claim 20, actuator/**601**/ has a face confronting the plurality of liquid containing chambers/**613**/, and changes a volume of each of the liquid containing chamber by changing its state between a state where the face confronting the plurality of liquid containing chambers is bent (col. 4, lines 9-30; fig. 1 & 2; ref. 613 & 613b)

*regarding claim 21, pressure chambers extend along a direction perpendicular to the direction in which an ink droplet is ejected through the nozzle (fig. 1 & 2; pressure chambers are formed by ink chamber/**613**/ with ink droplets ejected out of nozzle/**618**/ making the formation of plural pressure chamber formed in a perpendicular direction)

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*regarding claim 25, chamber is formed of a piezoelectric actuator having a plurality of laminated piezoelectric layers (col. 9, lines 55-61)

Claim Rejections - 35 USC § 103

4. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

5. Claims 4, 10 & 18 are rejected under 35 U.S.C. 103(a) as being unpatentable over Takahashi et al. (US 6,412,896).

Takahashi et al. discloses the following claimed limitations:

*regarding claims 4, 10 & 18, time T is approximately 9.0 μ sec (col. 4, line 62- col. 5, line 3; col. 9, lines 49-55; dimension of ink jet head/600/ where shown by example and arbitrary change is within the scope of the discloses to change pulse width i.e. change length of ink channel to affect time T)

Takahashi et al. does not disclose the following claimed limitations:

*regarding claims 4, 10 & 18, time T is 5 μ sec or less

It would have been obvious to one having ordinary skill in the art at the time the invention was made to utilize a time T of 5 μ sec or less, since it has been held that where the general conditions of a claim are disclosed in the prior art, discovering the optimum or workable ranges involves only routine skill in the art. **In re Aller, 105 USPQ 233.**

It would have been obvious at the time the invention was made to a person having ordinary skill in the art to utilize a time T of 5 μ sec or less as taught by Takahashi et al. for the purpose stably ejection of ink droplets.

6. Claims 6 and 12 are rejected under 35 U.S.C. 103(a) as being unpatentable over Takahashi et al. (US 6,412,896) in view of Takahashi et al. (US PG PUB 2001/0043241).

Takahashi et al. [896]disclose the following claimed limitations:

*regarding claims 6 and 12, actuator controller/625/ (fig. 3; col. 4, lines 9-30) stores plural waveform patterns of pulse signals (Drive waveform 1 & Drive waveform 2; col. 2, lines 54-64) being applied to the actuator/601/ in accordance with a volume of a droplet to be ejected upon a one-dot printing instruction

*upon selection of a waveform pattern for a minute droplet out of the plural waveform patterns, applies the ejection pulse signal/ejection pulse B/ and subsequently the additional pulse signal/ejection stabilizing pulse D / to the actuator/601/ (fig. 4b; col. 7, lines 59-67; col. 9, line 62- col. 10, line 6)

Takahashi et al. [896]does not disclose the following claimed limitations:

*regarding claims 6 and 12, selects any one of the plural waveform patterns in accordance with a gradation value of each pixel included in image data

Takahashi et al. [3241]disclose the following:

*regarding claims 6 and 12, selects any one of the plural waveform patterns in accordance with a gradation value of each pixel included in image data (paragraphs 0006 & 0009; gradation is controlled by the print density which is controlled by number of ink droplets; therefore apparatus for ejecting droplets selects necessary waveforms)

It would have been obvious at the time the invention was made to a person having ordinary skill in the art to utilize selecting any one of the plural waveform patterns in accordance with a gradation value of each pixel included in image data as taught by Takahashi et al. [3241] into Takahashi et al. [886] for the purpose of improved print quality.

7. Claims 22-24 are rejected under 35 U.S.C. 103(a) as being unpatentable over Takahashi et al. (US 6,412,896) in view of Kurashima et al. (6,457,818).

Takahashi et al. disclose all the claimed limitations except the following:

*regarding claim 22, ink supply source extends such that the pressure chamber can be sandwiched between the ink supply source and the actuator

*regarding claim 23, face of the actuator controlling the fluid containing chambers include only one of inner walls that define the pressure chamber

*regarding claim 24, plurality of liquid containing chambers are uniformly arranged along a direction perpendicular to the direction in which an ink droplet is ejected through the nozzle

*actuator extends over the plurality of liquid containing chamber along the direction in which the plurality of liquid chambers are arranged

Kurashima et al. disclose the following:

*regarding claim 22, ink supply source/330/ extends such that the pressure chamber/310/ can be sandwiched between the ink supply source/330/ and the actuator/36/ (fig. 4; col. 8, lines 5-19) for the purpose of driving multiple pressure chambers by a single actuator unit

*regarding claim 23, face of the actuator/**36/** controlling the fluid containing chambers include only one of inner walls/**vibrating plate, 36/** that define the pressure chamber/**310/** (fig. 4; col. 8, lines 5-19)) for the purpose of driving multiple pressure chambers by a single actuator unit

*regarding claim 24, plurality of liquid containing chambers/**310/** are uniformly arranged along a direction perpendicular to the direction in which an ink droplet is ejected through the nozzle/**23/** (figs. 4, 7 & 8; col. 8, lines 20-38 & col. 9, lines 19-35)

*actuator/**36/** extends over the plurality of liquid containing chamber along the direction in which the plurality of liquid chambers/**36/** are arranged (figs. 4, 7 & 8; col. 8, lines 20-38 & col. 9, lines 19-35) for the purpose of driving multiple pressure chambers by a single actuator unit

It would have been obvious at the time the invention was made to a person having ordinary skill in the art to utilize an ink supply source extends such that the pressure chamber can be sandwiched between the ink supply source and the actuator; and face of the actuator controlling the fluid containing chambers include only one of inner walls that define the pressure chamber; and plurality of liquid containing chambers are uniformly arranged along a direction perpendicular to the direction in which an ink droplet is ejected through the nozzle, actuator extends over the plurality of liquid containing chamber along the direction in which the plurality of liquid chambers are arranged as taught by Kurashima et al. into Takahashi et al. for the purpose of driving multiple pressure chambers by a single actuator unit

8. Claims 13 and 14 are rejected under 35 U.S.C. 103(a) as being unpatentable over Takahashi et al. (US 6,412,896) in view of Junhua (US PG PUB 2003/0085962).

Takahashi et al. disclose the following claimed limitations:

- *regarding claim 13, actuator control device/**625**/ (fig. 3; col. 4, lines 9-30) comprising:
 - *waveform memory that stores plural waveform patterns of pulse signals that correspond to different volumes of a droplet to be ejected upon a one-dot printing instruction (col. 9, lines 2-9)
 - *pulse generator that generates a pulse signal/**122**/ (fig. 3) to be applied to an actuator that changes a volume of a liquid containing chamber/**ink chambers, 613**/ on the basis of any one of the plural waveform patterns (col. 4, lines 9-30; fig. 1 & 2; ref. 613 & 613b)
 - *wherein one of the plural waveform patterns stored in the waveform memory includes:
 - *ejection pulse signal/**ejection pulse signal B**/ that increases the volume of the liquid containing chamber/**613**/ to cause ejection of a droplet and has a pulse width of A times a time T required for a pressure wave to propagate in one way longitudinally through the liquid containing chamber (col. 4, lines 31-36; col. 5, lines 62-65),, where A is a positive constant less than 1 (col. 6, lines 9-18; fig. 4b)
 - *only one additional pulse signal/**ejection droplet stabilizing pulse B**/ (fig. 4b;) to be applied following the ejection pulse, the additional pulse signal increasing the volume of the liquid containing chamber to pull back a part of the droplet about to be ejected (col. 6, lines 2-8)

Takahashi et al. does not disclose the following claimed limitations:

- *regarding claim 13, print data memory that stores a gradation value of each pixel included in image data.

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*droplet volume determining portion that determines, with respect to each pixel, a volume of a droplet to be ejected from a nozzle, on the basis of the gradation value stored in the print data memory

* waveform patterns corresponding to the volume of a droplet determined by the droplet volume determining portion

*regarding claim 14, the pulse generator generates, when a smallest volume of a droplet is determined by the droplet volume determining portion, the ejection pulse signal and the additional pulse signal on the basis of one of the waveform patterns corresponding to the smallest volume

Junhua disclose the following:

*regarding claim 13, print data memory that stores a gradation value of each pixel included in image data (paragraph 0173; first latch circuit and second latch circuit [gradation data “stored”]).

*droplet volume determining portion that determines, with respect to each pixel, a volume of a droplet to be ejected from a nozzle, on the basis of the gradation value stored in the print data memory (paragraph 0173; gradation is represented by two bits to determine dot size, therefore a determination has been determined)

* waveform patterns corresponding to the volume of a droplet determined by the droplet volume determining portion (paragraph 0185; decoder 45/selection data generator/)

*regarding claim 14, the pulse generator/signal generation circuit, 9/ (paragraph 0189) generates, when a smallest volume of a droplet is determined by the droplet volume determining

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portion, the ejection pulse signal and the additional pulse signal on the basis of one of the waveform patterns corresponding to the smallest volume (paragraph 0185; decoder 45/selection data generator/; paragraph 0188 – selecting pulse signal based on gradation data)

It would have been obvious at the time the invention was made to a person having ordinary skill in the art to utilize a print data memory that stores a gradation value of each pixel included in image data; droplet volume determining portion that determines, with respect to each pixel, a volume of a droplet to be ejected from a nozzle, on the basis of the gradation value stored in the print data memory; waveform patterns corresponding to the volume of a droplet determined by the droplet volume determining portion; and the pulse generator generates, when a smallest volume of a droplet is determined by the droplet volume determining portion, the ejection pulse signal and the additional pulse signal on the basis of one of the waveform patterns corresponding to the smallest volume as taught by Junhua into Takahashi et al. for the purposes of storing data (gradation values) for use by other control systems of the ink jet apparatus; and to select an appropriate waveform signal from memory to produce a high quality image.

Response to Arguments


9. Applicant's arguments with respect to claims 1-27 have been considered but are moot in view of the new ground(s) of rejection.


Communications with the USPTO

10. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Rene Garcia, Jr. whose telephone number is (571) 272-5980. The examiner can normally be reached on M-F 8:00AM - 4:30PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Stephen D. Meier can be reached on (571) 272-2149. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.


Rene Garcia Jr
08/06


STEPHEN MEIER
SUPERVISORY PATENT EXAMINER